Claims

1. A clock signal extraction device for extracting a clock signal from a periodic data signal, comprising:
- a phase detector (104, 106) for detecting a first phase difference between rising edges of said data signal and a rising edges clock signal and for detecting a second phase difference between falling edges of said data signal and a falling edges clock signal; and
- a clock generator (110, 112) for generating said rising edges clock signal so that said first phase difference is minimized, for generating said falling edges clock signal so that said second phase difference is minimized, and for generating said clock signal in dependence on said first phase difference and said second phase difference.

2. The device according to claim 1,
characterized in that
said clock generator (104, 106) generates said clock signal based on an average of said first phase difference and said second phase difference.

3. The device according to claim 1 or 2,
characterized in that
said clock generator comprises:
- a first clock generator (110) for generating said rising edges clock signal;
- a second clock generator (112) for generating said falling edges clock signal;
- a third clock generator (114) for generating said clock signal; and
- a controller (108) for processing said first phase difference and said second phase difference and for

controlling said first, second and third clock generator (110, 112, 114).

4. The device according to claim 1, 2 or 3,
characterized in that
said phase detector comprises:
- a first phase detector (104) for detecting said first phase difference between said rising edges of said data signal and said rising edges clock signal; and
- a second phase detector (106) for detecting said second phase difference between said falling edges of said data signal and said falling edges clock signal.

5. The device according to claim 3 or 4,
characterized in that
each of said first, second and third clock generators (110, 112, 114) comprises a voltage controlled oscillator.

6. The device according to claim 3, 4 or 5,
characterized in that
said controller (108) comprises a phase pump and a loop filter.

7. The device according to one of the preceding claims,
characterized in that
said device is used in a data extraction device (100) for extracting data from said data signal according to a rate of said clock signal.

8. The device according to claim 7,
characterized in that

said controller (108) controls said clock generator (110, 112, 114) for generating said clock signal such that the error rate of the extracted data is minimized.

9. The device according to claim 7 or 8,
characterized in that
said data extraction device (100) comprises a data sampler (116) for sampling said data signal.

10. The device according to claim 9,
characterized in that
said data sampler (116) comprises a D-type flip-flop.

11. A method for extracting a clock signal from a periodic data signal, comprising:
- detecting a first phase difference between rising edges of said data signal and a rising edges clock signal and detecting a second phase difference between falling edges of said data signal and a falling edges clock signal; and
- generating said rising edges clock signal so that said first phase difference is minimized, generating said falling edges clock signal so that said second phase difference is minimized, and generating said clock signal in dependence on said first phase difference and said second phase difference.

12. The method to claim 11,
characterized in that
said step of generating comprises generating said clock signal based on an average of said first phase difference and said second phase difference.

13. The method according to claim 11 or 12,
characterized in that

said step of generating further comprises:
- processing said first phase difference and said second phase difference; and
- generating and controlling said rising edges clock signal, said falling edges clock signal, and said clock signal.

14. The method according to claims 11 to 13,
c h a r a c t e r i z e d i n t h a t
said method further comprises:
- extracting data from said data signal according to a rate of said clock signal.

15. The method according to claim 14,
c h a r a c t e r i z e d i n t h a t
said step of generating further comprises generating said clock signal such that the error rate of said extracted data is minimized.

16. The device or the method according to one of the preceding claims,
c h a r a c t e r i z e d i n t h a t
said data signal is an optical data signal.